

THE
NOVUM
ORGANVM

OF

Sir FRANCIS BACON,
BARON of VERULAM,

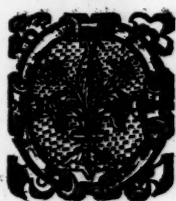
Viscount St. Albans.

EPITOMIZ'D:

For a clearer understanding of his

NATURAL HISTORY.

Translated and taken out of the Latine
by M. D. B. D.



LONDON,

Printed for *Thomas Lee* at the *Turks-head*
in *Fleetstreet*. 1676.

THE
MUSEUM
ORGANUM

OF
FRANCOIS BACON

BARON OF VERULAM

Vicomte de Verulam

EDITIO MINOR

For a full and complete list of his

LICENS: D

NATURAL HISTORY

Jan. 26. 1675.

Roger L'Estrange

Translated and taken out of the Latin

by M. D. B. D.



LONDON

Printed for Thomas Lee at the Turkey-head

in Fleetstreet. 1676.



THE
P R E F A C E
TO THE
R E A D E R.



Need not recommend to your perusal this useful Treatise, seeing that it proceeds from such a Genius, whose most trivial conceptions have obtained the esteem of his Age, not inferior in Learning to any of the former. He was a person of a sound judgement, sharp wit, vast comprehension, and of extraordinary abilities both natural and acquir'd. But I need not run over the praises of a person so well known amongst us to oblige my Reader to a kind reception, and favourable interpretation of this obscure, but useful Book: For the things therein contained are so excellent in themselves, and so well designed, that we may be inclinable of our own accord to embrace and peruse them.

The Author's purpose, as you may perceive, is to censure the limitations of Sciences to the bounds prescribed to us, by the shallow pates of some of former Ages, to discover the mistakes of our understandings, to point at the sources from whence they proceed, to rectify the common errors of men, backed by ill grounded Axioms, to direct us to a right interpretation of Nature's Mysteries, and oblige us to settle our judgements, upon better and sounder principles than ordinary; his purpose is to open to us a Gate to a greater Proficiency and improvement in all kind of Learning, to pull down the Walls of Partition, and remove the Non plus ultra; that we might sail to those Indies full of Gold and Jewels. I mean the Sciences not yet discovered to our World, and fetch from thence all the Rarities, the Knowledges, and Inventions, that might pleasure and benefit our humane life. For that purpose he adviseth us not to take things and notions too much upon Trust, but to ground our belief upon Practice, and well ordered experience. He lays down several Principles, which may seem strange and new; but if they be rightly examined, we shall find them naturally proceeding from the nature of things. I confess the most excellent conceptions are wrapped up in obscure terms, and in such new contrived expressions, that King James at the first perusal judg'd this Novum Organum to be past all Mans understanding. But we may con-

To the Reader.

consider, that a new Method, and new Things and Principles deserve new expressions, and that the learned Author speaks not to the Vulgar, but unto the Learned, unto whom he delivers other Lemmas never found out before, and directs them in adventures to seek and to proceed on without minding the discouragements and oppositions of our Predecessors in Learning.

This Treatise therefore was added upon a reasonable Addition to his Mathematical History, because he would have made it too voluminous, I have been obliged to rather omit some things, and Directions as might be answerable to that subject. I must needs confess, after a serious perusal, I did scarce know what was to be set aside; for all the things things therein contained, are so material and seasonable, that I have wondered, that our English Curiosi have not had the desire to study and understand the directions that are there given to undeceive their mistaken Judgements. In such a Case, that this *Novum Organum* might be the better intelligible, a weer interpretation is not sufficient, in regard of the Authors difficult and new found expressions, a Comment would be required, which if it were well and judiciously composed according to the Authors true meaning and intent, I am persuaded every one would be of my Judgement, that it is the best and most useful Treatise of our Days for the purpose that is designed. I am persuaded that it might be of a singular use to such Vertuosi amongst us, as are not perfectly acquainted with the Latine Tongue, and yet imploy their Time and Dexterity in the improvement of their abilities, and finding out inventions useful to the Life of Man, for it would supply them with such principles as their leisure, and convenience might wonderfully improve in new discoveries.

I was sorry that my Pen was limited to so few sheets, and that I had not the liberty to make the whole *Organum* appear in our Language. For brevity sake therefore I have in some places shortened the Authors expressions, however this will be sufficient to give a taste of the whole, which such as understand the Language of the Learned may peruse at their leisure.

M. D.

Part



Part of the
Novum Organum,
OR,
APHORISMS
OF THE
Interpretation of NATURE and KING-
DOME of MAN.

Taken out of the First Book.



MAN, Nature's Minister and Interpreter, acts and understands only so much of the ordering of Nature, as he hath observed by the assistance of Experience and Reason: more he neither doth, nor can apprehend. Neither the Hand alone, nor an Understanding est to it self, can do much. Things are performed by instruments and helps, which the Understanding needs as much as the Hand. Now as Mechanick Instruments assist and govern the Hand's motion, likewise the instruments of the Understanding prompt and advise it.

Humane Knowledge and Power are co-incident in the same, or happen to be alike, because ignorance of the Cause renders the Effect unintelligible: for Nature is not overcome without submission, and that, which in Contemplation stands instead of the Cause, in Operation serves as a Rule.

As to Operation, Man can do no more but only apply or remove natural Bodies. The rest Nature willingly compleats.

The Mechanick, the Mathematician, the Physitian, the Chymist, and the Magician are variously concerned in natural Operations, but as it happens at present their attempts are but slight, and their successes inconsiderable.

It were an extravagancy, and a plain contradiction to expect the accomplishment of those things, which were never yet done unless by means never yet attempted.

B

Even

Even those Operations which are found out are rather to be ascribed to Chance and Experience than to Sciences; for the Sciences, which are now professed amongst us, are nothing else, but an adorning and a setting forth of things formerly invented, not the modes of Invention or the desigments of new Operation.

The Cause and Origine almost of all the Mischiefs, that happen in Sciences, is this alone, that we too much admire and set up the strength and power of our understanding, and we neglect the true helps and aids thereof.

Natures subtilty far exceeds the subtilty of our Sense, or that of our Understanding; so that the delicate meditations of Mankind, their speculations and inventions are but foolish things, if they were narrowly searched into.

As Sciences commonly so called are unprofitable for the invention of Operations, so the Logick now in use is not conducible to the finding out of true Sciences.

The Logick, which we now use tends to the establishment and confirmation of Errours, which are founded in vulgar notions rather than to a serious enquiry after Truth, therefore it is more hurtful than profitable.

A Syllogisme is not used amongst the principles of Sciences, and in medical axioms it is imployed in vain, for it falls much short of Natures subtilty. It hath therefore a command over assent, not over the things themselves.

A Syllogisme consists of Propositions, Propositions of Words, Words interpret Notions, therefore if Notions, the basis of Things be confus'd, and rashly abstracted from things, nothing will be firm that is built upon them, therefore our only assurance is in a right induction.

There is no soundness in Logical and Physical Notions, neither substance, nor quality, action, passion, nor being it self, are proper Notions, much less heavy, light, thick, thin, moist, dry, generation, corruption to attract, to expel element, matter, form, &c. All these are phantastical and ill designed.

The Notions of the lower Species, as a man, a dog, a dove, and the immediate apprehensions of our senses; namely, hot, cold, white, black, don't much deceive us, and yet nevertheless by the fluidity of matter and mixture of things they are sometimes confounded. All other Notions, which men have hitherto used are aberrations, and are neither duly nor truly abstracted, and raised from the very things themselves.

The things that are already invented in Sciences, are such as most commonly depend on vulgar Notions. If any will search into the more inward, and remote mysteries of Nature, he must make use of Notions and Axioms, abstracted from things in a more certain and solid manner, that the working of the Understanding may be better and surer.

There are and may be two ways of searching and finding out truth: one from Sense and particulars leads to the most general Axioms, and out of those Principles and their unquestionable Authority judges and finds out middle Axioms. This way is much in use. The other raiseth Axioms from Sense, and particulars by a continual and gradual ascent it proceeds at last to generals. This is a true way but not yet attempted.

The Understanding left to it self goes the former way, observing a Logical method; for the mind delights to leap to generals, that it might acquiesce there, and after a little stay it loaths Experience. But these evils

evils are now at length augmented by Logick for the pomp of disputations.

An Understanding left to it self, accompanied with sober, patient, and grave Wit, if not hindered by former precepts, essays the other way, which is right but not successful; because when the Understanding is not directed and assisted, is but weak, and unable to overcome the obscurity of things.

Either way derives its beginning from sense and particulars, and acquiesces in things most general. But yet they differ very much, for the one does lightly run over experience and particulars; the other converses in them in a right and methodical manner. Again the one layes down at first, certain abstract and unprofitable generals. The other rises by degrees to these things, which indeed are more known to Nature.

It can never be that Axioms framed by arguing, for finding out new Operations, should be of any value, because the subtilty of Nature doth far surprize the acuteness of disputation. But Axioms rightly abstracted in order from particulars, do easily discover and shew forth other new particulars, and therefore by that means Sciences became active.

The Axioms now in use sprang from small and slender experience, and a few common particulars, they are for the most part made and enlarged according to their measure, so that it is no wonder, if they lead not to new particulars. Now if by chance any instance not observed or known before, offer it self, the Axiome is falsed by some frivolous distinction; whereas it is more proper, that the Axiom it self should be mended.

That humane reason, which we use in Natures assistance, we are wont to call anticipations of Nature, because it is rash and hasty. But that reason, which is rightly extracted out of things, we call interpretation of Nature.

Anticipations are strong enough to gain consent, seeing that if all men were equally and conformably made, they would agree well enough among themselves. To speak plainly, no right judgement can be made of our way, nor of those things which are found out agreeable unto it by anticipations, I mean by the reason now in use: because we cannot desire any one to stand to the judgement of that thing which is it self called in question.

It is no easie matter to deliver; or explain those things which we have produc'd; because things new in themselves are to be understood by the Analogy they have with old ones.

Borghas tells us of the French Expedition into *Italy*, that they came with chalk in their hands to mark out their Inns, and not with arms to break through them. Our design is the same, that our doctrines might be admitted by well disposed and capacious Souls, for there is no need of confutations, where we disagree in the very principles, notions, and forms of demonstration.

Their reason, who held *non-comprehension*, and our way do in some sort agree in the beginning, but they vastly differ and are opposite in the end, for they absolutely affirm, that nothing can be known, but we say not much can be known in Nature, in that way as it is now handled. They by their assertion destroy the authority of Sense and Understanding, we study and give remedies to help them.

Idols, mistakes, and mis-apprehensions, which now possesse, and are deeply rooted in Mans Understanding, so besiege the minds of Men that

Truth can hardly get admision, but if it should they would hinder and disturb the restoration of Sciences, unless Men being fore warned would arm themselves against them, as much as they could.

There are four sorts of Idols or false Images, which besiege Mens minds: we, for distinction sake, have called them first *Idola Tribus*. 2. *Idola Specus*. 3. *Idola Fori*. 4. *Idola Theatri*.

The raising Notions and Axioms by true induction is doubtless a proper remedy to drive away and remove these Idols, yet their indication is of great use, for the doctrine of Idols conduces to the interpretation of Nature; even as the doctrine of Sophistical arguments doth to vulgar Logic.

Idola Tribus are founded in humane Nature it self, and in every Family and Stock of Mankind. For humane sense is safely affirm'd to be the measure of things. On the contrary, all the conceptions both of sense and reason are taken from the analogy of Man, not the analogy of the Universe. Humane Understanding is like an unequal looking-glass to the rayes of things, which mixing its own Nature with the Nature of things, doth wrest and infect it.

Idola Specus are the mis-apprehensions of every individual Man. For every one hath besides the mistakes of humane Nature in general, a den or individual cave, where the light of Nature is obscured and corrupted. This happens either through every Mans singularity; or through education and conversation among others; or by reading of Books and the authorities of them who are honoured and admired by every one, or through the different impressions which occur in a prepossessed and predisposed, or in a calm and equal mind, or the like: so that the Spirit of man, as it is placed or qualified in every Man, is a various, a troubled, and a fortuitous thing; wherefore *Heracitus* said well, that men sought after Sciences in lesser worlds, and not in the great and common World.

There are also Idols or mis-apprehensions arising from the mutual contracts, and also ciations of Men, which by reason of humane commerce and society we call *Idola Fori*: For Men are associated by speech, but words are imposed according to the vulgar capacity; therefore a vitious and an improper imposition of words doth wonderfully mislead and clog the Understanding. Neither the definitions and explications, wherewith learned men are wont to defend and vindicate themselves in some things, do mend the matter for words, do plainly force the Understanding and disturb all things, they lead men into many idle controversies and foolish inventions.

Lastly there are Idols or misapprehensions, which are entered into Mens minds from divers opinions of the Philosophers, as also from the perverse Laws of demonstrations: these we call *Idola Theatri*. Because all the kinds of Philosophy, which have been invented and received we look upon as so many Fables produced and acted to make fictitious and senical Worlds. Neither speak we of those amongst us, or only of the ancient Philosophers and Sects; seeing many the like Fables may be composed and made, because the causes of the different errors are for the most part common; neither do we understand this only of universal Philosophy, but also of many Principles and Axioms of Sciences which have prevailed by tradition, credulity and neglect. But of all these kinds of Idols we must speak more largely and distinctly, that so the humane intellect may take more heed.

Humane Understanding is inclinable of it self to suppose a greater order and equality in things than it finds. And whereas many things in Nature are monodical and altogether unlike, yet it appropriates to them parallels, correspondencies, and relatives, which are not from hence, are derived those Figments.

In Cælestial Bodies all things are moved by perfect Circles. In the meantime they reject Spiral and Serpentine lines, retaining yet the names: From hence it is, that the Element of Fire is introduced to make a quaternion with the other three, which are within the reach of our senses. To the Elements also, as they call them, fancy ascribes to them a double proportion of excess in their mutual rarefaction, and such like dreames are invented. Nor is this vanity predominant in opinions only, but also in simple notions

The Humane Understanding attracts all other things to give its suffrage and consent unto those things which once please it, either because they are received and believed, or because they delight. And though a greater strength and number of contrary instances occur, yet it doth either not observe, or condemn them, or remove, or reject them by a distinction not without great and dangerous prejudice, by which an inviolable authority remains in those former conceptions. Therefore he gave a right answer, who, when a list of the Names of such as had paid there their vows for escaping the danger of Shipwrack, was shewn to him hung up in a Temple, and when he was questioned whether he did not acknowledge the Deity of the gods? He in answer demanded what was become of their pictures who had perished after that they had paid their Vows? There is almost the same reason for all Superstition, as in Astrological dreams, presages, &c. Men delight in such vanities, they mind the events when they come to pass, but when they fail, which is very often, they neglect and pass them by. But this evil more subtilly invades Philosophy and Sciences, wherein that which once takes, infects and corrupts the rest, though more firm and better. But in case this delight and vanity were wanting, yet it is a proper and perpetual error in Humane Understanding, to be rather moved and stirred up by affirmatives than by negatives, although in truth it ought to be indifferent to both: Yet on the other hand the strength of a negative Instance is greater in constituting every Axiom.

Humane Understanding is for the most part moved with those things, which suddenly and at once effect and reach the mind, and wherewith the fancy is wont to be filled and puffed up. As for the rest it supposes and fancies to have them in a kind of imperceptible manner, even like those few things that possess the mind. But as to that quick running over remote and heterogeneous instances, whereby Axioms are tried as it were by fire, the Understanding is altogether slow and unable, unless severe Laws and violent commands be imposed upon it.

Humane Understanding cannot rest, but still desires more and more, though all in vain. Therefore it is not to be imagined that Heaven should hear any extream or extime parts; for it may be alwayes necessarily urged, that there is something further. Again it cannot be conceived how Eternity hath run along unto now, because there is a common distinction usually admitted, that it is infinite *a parte ante* & *a parte post*, which can in no wise be proved, for then it would follow that one infinite is greater than another, and that an infinite consumeth and tends to a finite. The like nicety occurs through the weakness of our imagination concerning

ning lines alwayes divisible, but this mental infinity more dangerously interposes in the invention of causes : For whereas Universals chiefly ought to be in a positive nature, as they are found out, being not really causable, yet the Humane Understanding being unable to rest, still desires things more known, but whiles it tends to further things it falls back to nearer ones, *viz.* Final causes, which indeed arise rather from Humane Nature, than the nature of the Universe. Out of this Fountain Philosophy is strangely corrupted. But he is equally an unskilful and a slight Philosopher, who seeks out a cause in primary universals, as he who desires it not in subordinate and subaltern things.

Humane Understanding is not an *Ignis fatuus* a meer light, but it receives an impression from the Will and the Affections, which produces the reason why it desires Sciences, for what a Man had rather have true, that he resolves to believe. Therefore he rejects difficult things, through impatience of inquiry; sober things, because they confine the hope; the high Mystery of Nature, because of our natural Superstition; the light of experience, because of an arrogancy and pride, least the mind should seem to converse in vile and transitory affairs, he rejects Paradoxes being too much over-ruled by the mistakes of the vulgar. Lastly affection qualifies and infects the Soul many wayes which cannot be conceived.

But the greatest hinderance of the Humane Understanding, and its most dangerous errors proceed from the dulness, unsufficiency, and deceptions of the senses : those things which make impressions on the senses are of a greater weight than others of a higher nature, that do not affect them : Therefore contemplation most commonly ends with the sight, insomuch that there is little or no observation made of invisible things. Therefore the actions of the Spirits shut up in sensible bodies are hid from us, And all subtil transformation, that happens in the parts of the grosser things, which we commonly stile alteration, but is in Truth a subtil metaschematism escapes also our knowledge. Nevertheless, if these two that we have named be not found out, there can be no great matter performed in the works of nature.

Again the nature of common air, and of all Bodies which in thinness surpass the air, they being many in number are almost unknown, for sense in it self is a weak and an erroneous thing, nor do the Organs conduce much to enlarge or sharpen the senses, but the truest interpretation of Nature is made by instances, and by fit and proper experiments, when sense judges of the experiment, the experiment of Nature, and of the thing it self.

The Humane intellect is by its own Nature carried on to abstracts, and those things which are unstable it fancies to be constant.

But it is better to dissect Nature than abstract her, which was done by *Democritus's* School. By that means he searched further than the rest into Nature. For that purpose we must rather examine matter, its schemes and transformations, its pure acts and the Law of action and motion. Forms are but the invention of mens brains, unless you will call the Laws of the act forms.

Of this kind are those false imaginations, which we call *Idola Tribus*, they proceed, either from the equality of the substance of the humane Spirits, or the prepossessions, coarctations, and turbulent motions thereof, or from the inspirations of the passions, or disagreement of the senses, or the manner of impression.

Idola

Idola Specus proceed from the proper nature of every individual mind or body, as also from education, custome or other casualties, which kind though various and manifold, yet more especially we propound those which require most caution, and have greatest power to defile the Understanding, and render it impure: contemplations of Nature and most simple Bodies only disturb and impair the Understanding, but contemplation of Nature and of Bodies compound, and in their configuration astonish and dissolve the intellect. This is most evident in the School of *Hencippus* and *Democritus* compared with other Philosophy, for it so much considers the particles of things, that it almost neglects their frames: and others so amazedly behold them, that they cannot arrive to Natures simplicity. These contemplations therefore are to be altered and interchangeably assumed, that the Understanding at the same time, may be made penetrating and capable, and those inconveniencies we speak of be avoided with the false notions proceeding from them.

Let therefore your speculative prudence be so disposed in expelling and removing the *Idola Specus*, which proceed either from the predominancy, or excess of composition and division, or from our affection to the times, or from large and small Objects. In general let every one, who studies the nature of things, chiefly suspect that which captivates his Understanding, and so much the greater heed is to be taken in these opinions, that the Understanding may be kept equal and pure.

But *Idola Fori* are the most troublesome of all, which, by a confederacy of words and names, have insinuated themselves into the Understanding. For men believe that their Reason governs words, but so it happens that words retort and reflect their power upon the Understanding. This hath made Philosophy and Sciences Sophistical and unactive. Now words are for the most part accommodated to vulgar capacities, and by lines most apparent to common apprehensions they divide things. But when a sharper intellect, or more diligent observation would transfer those lines, that they might be more agreeable to Nature; words make a noise: from hence it comes to pass, that the great and solemn disputations of learned men, often end in controversies concerning words and names, with which, according to the custome and prudence of Mathematicians 'twere a wiser way to begin, and to reduce them into order by definitions. And yet definitions in natural and material beings cannot remedy this evil because they also consist of words, and words beget words, so that it is necessary to have recourse to particular instances, and their ranks and orders, as we shall presently shew, when we come to the manner and reason of constituting notions and Axioms.

Misapprehensions forced by words upon the Understanding are of two sorts. 1. The names of things which are not: for as there are things which through inadvertency wanting a name, so are there names without things, through a Phantastical supposition. 2. Or the names of things which are but confused, ill determined, rashly, and unequally abstracted from things. Of the first sort are Fortune, the *Primum Mobile*, the Planetary Orbs, the Element of Fire, and such like fictions arising from vain and false speculations. This kind is easier cast out, because it is exterminable by a continued abnegation and antiquation of such speculations. But the other sort is perplex'd and deeply rooted, proceeding from an ill and unskilful abstraction. For example sake, take any word, *Humidum* if you please, and let us see how its various significations agree, and we shall

shall find this word *Humidum* to be nothing else but a confused note of divers actions enduring no constancy or reduction; for it signifies that which easily circumsinds it self about another body, and is in it self indeterminable and inconsistent, that which easily gives place on all sides, and easily divides and dissipates, and as easily collects, and reunites it self, that which easily flows and moves, easily adheres to another body and moistens it, that which is easily reduced into a liquid, or melts, having been before consistent or solid: Therefore if you consider the predication and imposition of this word taken in one sense the Flame is moist, in another sense the Air is not moist. In one sense again small dust is moist, in another glass is so. Whence it is evident, that this notion was only rashly abstracted from waters and common liquors without any due verification.

In words also there are certain degrees of pravity and error, less vitious are the names of some substances, especially the lowest Species well deduced, for the notion of Chalk and Clay is good, the notion of Earth bad, more vitious are the actions of Generation, Corruption, Alteration: The most vitious qualities, except the immediate objects of sense, are heavy, light, rare, dense, &c. And yet even among these it cannot be helped but some notions will be better than others, accordingly as more copious matter supplies Humane sense.

The other mistakes named *Idola Theatri*, are not innate, nor secretly wrought in the Understanding, but by fabulous speculations, and the perverse Laws of demonstrations plainly infused and received. But in these to undertake or endeavour a confutation is not agreeable to what we have spoken. For seeing that we neither agree in our principles nor demonstrations all disputation is taken away. But this is good luck for the Ancients, that they may preserve their reputation, for nothing is detracted from them, seeing the way is so questionable. Because a lame Man, as they say, in the way, out goes a Racer out of the way, for tis evident the stronger and nimbler he is, the greater is his aberration, whiles he is out of the way.

But such is our manner of inventing Sciences, that we attribute not much to the sharpness and strength of wit, and yet we almost equalize them, for even as the describing of a right line or perfect Circle much depends on the steadiness and exercise of the hand, if it be done meerly by the hand; but if a rule or compasses be used, there is little or no such dependancy upon the hand: So fares it exactly with our Reason. Although there be no particular use of confutations, yet we must say something of the Sects and Kinds of these Theories, and afterwards of their outward signs, because they are in a bad condition, and lastly of the causes of so much unhappiness, and so long and general a consent in error, that Truth may have an easier access, and the Humane Understanding may be more thoroughly purged, and rid of these mistakes.

Idola Theatri or theoretical mistakes are many, and may be more, and in time to come will be, for unless mens wits had been employed about Religion and Divinity during many Ages, and also about civil Governments, especially Monarchies, they had detested such novelties in contemplations. So that Men addicted unto them, ran the hazard of their fortunes, not only deprived of a reward, but also exposed to contempt and envy. Doubtless many more Sects of Philosophy, and Theories like to those, which once in great varieties flourished amongst the Grecians, had

had been introduced : for as upon the ethereal *Phænomena's* more figures of Heaven may be formed, likewise many more various opinions may be as easily founded and established upon the *Phænomena's* of Philosophy : Now the Fables of this Theater are like those that are acted on the poetical Stage, whence it comes to pass, that Scenical and feigned narrations are more quaint and elegant than those taken out of true history, and better please the Readers.

In general either much out of little, or little out of much is assumed into Philosophical matter, so that on all sides, Philosophy is founded on the too narrow basis of experience, and Natural History, and determines out of fewer things than it ought ; for the rational sort of Philosophers snatch from experience several vulgar things, and they to neither certainly found out, nor diligently examined or tried, the rest they place in meditation, and the exercise of wit.

There is another sort of Philosophers, who have bestowed a great deal of pains in few experiments, and from thence have presumed to draw and frame a Philosophy strangely wresting all other things thereunto.

There is also a third sort of them, who intermingle divinity, and traditions of Faith and Adoration amongst whom the vanity of some has inclined them to seek and derive Sciences from Spirits and Demons. Therefore the stock of Errours and false Philosophy is threefold, namely Sophistical, Emperical, and Superstitious.

Of the first kind *Aristotle* is an evident Example. By his Logic he corrupted natural Philosophy made the world consist of Categories attributed to the humane Soul, a most noble substance, a genus made up of secondary notions, transacted the business of dense and rare, whereby bodies under go greater or lesser dimensions or spaces by the cold distinction of act and power. He asserted only one proper motion to be in all bodies, and if they had any other, that he said was from another ; many more things he affirmed according to his fancy, which he imposed upon Nature, being every where more solicitous how he might explain himself in answers, and make any thing positive in words, than of the internal truth of things. This plainly appears if you compare his Philosophy with others famous amongst the Grecians, for the *Homoïomera* of *Anaxagoras*, the Atoms of *Leucippus*, and *Democritus*, the Heaven and Earth of *Parmenides*, the discord and concord of *Empedocles*, *Heraclitus's* resolution of Bodies into the adaphorous nature of Fire, and the replication of them to density, have something of natural Philosophy in them, and a relish of nature and experience : whereas *Aristotle's* Physicks are nothing but logical notions, which under a more specious name, not nominal but more real he retracts in his Metaphysicks, nor let not that move any one, that in his Books of Animals, in his Problems and other Treatises he frequently useth Experiments. For he first decreed them, neither did he rightly consult experience in establishing his Determinations and Axioms, but after he had determined them according to his pleasure, he made experience a slave to his fancies : And upon this account he is more to be blamed than his modern Followers, I mean a Sect of Scholastical Philosophers, who have altogether forsaken experiments.

But the Emperical kind of Philosophy brings forth more deformed and monstrous opinions than the Sophistical or rational, because it is not founded in the light of common notions, which though slender and superficial is notwithstanding in some measure universal and conducive to many

many things, but in a few narrow and obscure experiments. And therefore to those who daily converse in such experiments, and have thereby corrupted their fancy, this Philosophy seems probable and certain, but to others incredible and vain. A notable example whereof we find in the Chymists and their opinions, but now scarcely any where else, unless in Gilbert's Philosophy. However we must by no means omit a caution concerning this Philosophy, because we inwardly foresee and presage that if men awakened by our precepts, shall at last betake themselves to experience, bidding adieu to Sophistical doctrines, they will sustain some damage, through a premature and inconsiderate haste of the understanding, by soaring too soon to generals and principles, which evil we ought to prevent.

But the corruption of Philosophy through superstition and intermixed Divinity extends it self further, and works much mischief, both to Philosophy in general and particular. For the humane understanding is no less obnoxious to the impressions of Fancy, than to the impressions of vulgar notions. For the contentious and Fallacious kind of Philosophy ensnares the understanding, but the other kind being phantastical, swollen and Poetical doth rather flatter it. For there is in Man a certain ambition of the Understanding as well as in the Will, especially in sublime and elevated Wits. Of this kind you have an example amongst the Grecians, especially in Pythagoras, but joyned with gross superstition, but more dangerously and subtilly in Plato, and his School. This kind of evil is found in the parts of other Philosophers; by the introduction of abstract Formes, final Causes, first Causes, and frequent omitting the medial, and the like. Wherefore take great heed to this matter, for it is the worst of evils to deifie errors, and to adore vain things may be well accounted the plague of the Understanding.

Some modern Men guilty of much levity, have so indulged this vanity, that they have essayed to found natural Philosophy in the first Chapter of Genesis, the Book of Job, and other places of Holy Writ, seeking the living among the dead. Now this vanity is so much the more to be check'd and restrained, because by unadvised mixture of divine and humane things, not only a phantastical Philosophy is produced, but also an Heretical Religion. Therefore it is safe to give unto Faith with a sober mind, the things that are Faiths.

Hitherto our Excellent Author hath spoken of the bad authority of Philosophy, founded in vulgar notions, a few Experiments, or in Superstition: he examines next the depraved matter of Contemplation especially in natural Philosophy.

He proceeds next to discover to us by what means demonstrations lead us into errors and mistakes, and concludes that experience is the best demonstration, if it be founded upon mature Experiments. He discourses afterwards of the several sorts of Philosophers among the Greeks, and takes notice of their imperfections, of their ignorance in ancient History, and in Cosmography, so that they could not be acquainted with so many experiments, as the Learned of our dayes.

Afterwards he discourseth of the causes of Errors, and of their long continuance in credit in the World, that none might wonder how it comes to pass that some in these last Ages, find so many mistakes in the Learning and Wit admired in former Ages.

The first Cause of the small proficiency in Sciences, he saith, is the streights of time, and their ignorance of former Times: for their Observation had not scope enough, nor sufficient assistance from true History, to gather right and judicious Experiments.

In the second place another Cause of great moment certainly offers it self; namely that in those times, when the wits of men and Learning flourished most or but indifferently, Natural Philosophy had the least share in humane contemplations: nevertheless this ought to be accounted the great Mother of Sciences: for all Arts and Sciences, pluck'd away from this Root. may perhaps be polished and accommodated to use, but they will never grow. Now it is evident, that since the Christian Faith was embrac'd and encreas'd the most part of the rarest Wits applied themselves to Divinity. To this end large rewards were propounded, and all manner of helps plentifully afforded. This study of Divinity took up the third part or period of time amongst us Europeans, and the more because about that time Learning began to flourish, controversies touching Religion did wonderfully increase: but in the preceding Age, during the second period among the Romans, the chiefest meditations and studies of Philosophers were employed and spent in Moral Philosophy, which was then the Heathens Divinity. Moreover the greatest Wits in those dayes for the most part applied themselves to Civil affairs, by reason of the Roman Empires greatness, which required the labours of many men. But that Age wherein Natural Philosophy seem'd chiefly to flourish among the Grecians was a parcel of time of small continuance, for even in ancienter times, those Seven, called Wisemen, all except *Thales*, applied themselves to Moral Philosophy and Politicks. And in after times, when *Isocrates* had brought down Philosophy from Heaven upon Earth, Moral Philosophy prevailed further still, and diverted mens thoughts from physical speculations.

That very period of time also, wherein Physick Enquiries flourished was corrupted and spoiled with contradictions, and new determinations. Wherefore Natural Philosophy in every one of those periods, being greatly neglected or hindred, 'tis no wonder men profited so little in it, seeing they altogether minded other things.

Add moreover, that those who studied Natural Philosophy, especially in these modern times, did not wholly addict themselves thereunto, unless perhaps you may alledge the example of some Monk in his Cell, or Nobleman in his Country House. So at length it was made but a passage and draw-bridge to other things.

This, this famous Mother of Sciences, was basely thrust down into servile offices, and made a drudge to wait upon Medicine, or the Mathematicks; and again to wash the immature wits of young men, and give them a superficial mixture, that they might afterwards be the better qualified to receive of another. In the mean while let no man expect a great progress in Sciences, especially in the practical part, unless natural Philosophy be produced to particular Sciences, and those again reduced to Natural Philosophy: for hence it comes to pass, that Astronomy, Opticks, Musick, many Mechanichal Arts, Physick it self, and what is more wonderful, even Moral Philosophy, Politicks, and Logick, have for the most part no considerable depth, but languish in the surface and variety of things, because when once these particular Sciences are divided, they are no longer nourished by Natural Philosophy, which out of the Fountains

and true contemplations of motions, rayes, founds; texture and figurati-
on of Bodies, affections, and intellectual apprehensions, communicates
new strength and augmentation to them. And therefore 'tis no wonder,
that Sciences grow not since they are separated from their roots. Another
great and powerful cause, why Sciences are so little advanced, is this, that
race cannot rightly be run, where the Goal is not rightly placed and fixed.
Now the true and legitimate mark of Sciences is to enrich Mans life with
new inventions and forces. But the greater number of men know nothing
of this, because they are mercenary and professory, unless it happens that
some Artist of a sharper wit, and ambitious of Glory, studies some new
inventions, which commonly tends to his own undoing. Therefore most
Men are so far from propounding to themselves the advancement of Arts
and Sciences, that even out of those things that they have, they seek no
more than what may be converted into professory use, gain, reputation,
or the like advantages. And if any one amongst the multitude seeks know-
ledge ingeniously and for it self, yet you will find he doth this rather to
obtain variety of contemplations and precepts, than for the rigid and se-
vere inquiry of Truth. Again suppose another more severely enquires
after Truth, yet even he propounds to himself such conditions of Truth
as may satisfie his mind and understanding in reference to the causes of
things known long ago, not those which may give fresh pledges of ope-
rations or new light to Axioms. The end therefore of Sciences being not
yet rightly defined, or well assigned by any body, no wonder if Error
and mistakes attend those things which are subordinate thereunto.

*The Noble Author condemns next the erroneous wayes which conduct to
Sciences; namely obscure Traditions, giddy Arguments, the windings of
Chance or unclean Experience; and wonders that none yet have recommend-
ed sense, and well ordered Experience, which he supposes to be partly caused
by a great mistake. That the Majesty of Humane Understanding is impair-
ed with long conversing in Experiments and particular things, subject to
sense, and determined to matter; especially seeing these things are labo-
rious in the inquiry, ignoble in the meditation, harsh in discourse, illi-
beral in the practice, infinite in number, and full of subtilty.*

Again the reverence of Antiquity, and the authority and consent of
those who have been accounted great men in Philosophy, has detained
and inchaunted men from making any progress in Sciences.

As for Antiquity the opinion which men entertain of it, is idle and in-
congruous to the word it self, for the old age, and great age of the world
are terms equivolent to antiquity, and ought to be attributed to our
times, not to the youthful age of the world, that wherein the Ancients
lived.

For that Age in respect of ours was greater and ancier, in respect of
the World it self, lesser and younger: and therefore in like manner, as
we expect a greater knowledge in Humane Affairs, a more mature and a
riper judgement from an Old Man than from a Young Man, by reason of
his Experience, and the variety and plenty of things which he hath seen,
heard, observed, and understood, so also far greater matters may ratio-
nally be expected from our Age, than from the ancient times, if it would
but know its strength, and were willing to try and mind things, because
we live in the Worlds old Age, and are stored with infinite experiments,
and advanced in our noble Observations. *The discoveries of other Lands*

unknown

unknown to former Ages are no small helps to our experience. Besides it is a great weakness to attribute so much to ancient Authors, for Truth is the Daughter of Time not of Authority, and the ancientest times are the youngest in respect of the World. The other cause of mens mistakes is their admiring the operations which can shew grey hairs, and a too great esteem of liberal Arts and Learning already found out, which is an art of simplicity and childishness. But the greatest damage hath happened to Sciences through pusillanimity; and the smallness of those tasks, which humane Industry hath proposed to it self, and yet, what is worst of all, that pusillanimity is accompanied with Arrogance and disdain.

Moreover Natural Philosophy in all Ages hath had a troublesome and harsh Enemy; namely Superstition, and a blind immoderate zeal of Religion.

Lastly the way to all Reformed Philosophy hath been blocked up by the unskilfulness of some Divines, who were afraid lest a deeper enquiry should dive into Nature beyond the bounds of Sobriety, traduce and falsly wrest those things, which are spoken of Divine Mysteries in the sacred Writings, against Searchers of divine Secrets: Others cunningly conceive, if the means be unknown, which they think greatly concerns Religion, all things may more easily be referred to the deity. Others from their example fear least motions and mutations in Philosophy should terminate in Religion.

Again all things in the manners and institutions of Schools, Universities, Colledges, and the like places destinated for learned Men, and getting Learning, are found to be against the advancement of Sciences, &c.

But the greatest Obstacle in the progress of Sciences, and new undertakings thereof is discerned in the dispairing of men, and a supposed impossibility, for even wise and grave men are wont to diffide in these things, pondering with themselves the obscurity of Nature, shortness of Life, deception of the Sences, weakness of judgement, difficulty of Experiments, and the like, &c.

We must take our beginnings from God, in what we are about, for the excellent nature of Good therein it manifestly from God, who is the Author of Good, and Father of Lights.

The Foundations of Experience, for we must descend to them, have hitherto been either none at all or very weak; neither hath a sufficient System of particulars been any wayes as yet found out and congested, either in number, kind, or certainty, able to inform the understanding.

In the plenty of Mechanical Experiments, there is discovered a great want of such as assist or tend to the information of the understanding, &c.

Not onely a greater plenty of Experiments is to be sought, and procured, differing in kind from what ever was yet done, But also another method, order and process are to be introduc'd, for the continuing and promoting of Experience. For wandring Experience, guided by it self, is a meer cheat, and doth rather amaze men than inform them. But when Experience proceeds regularly, orderly, and soberly, there may be some better hope of Sciences.

Seeing there is such a great number, and as it were an Army of particulars, but so scattered and diffused, that they disgregate and confound the understanding, we can expect no good from the skirmishes, light motions, and transursions of the understanding, unless by fit, well disposed,

and exact Tables, there be an instruction, and co-ordination of those things which appertain to the subject of our enquiry: and the mind be applied to the preparatory and digested helps of these Tables.

But when this plenty of particulars is rightly and orderly placed before our eyes we must not presently pass to the Inquisition, and Invention of new particulars or operations, or if we do we must not rest in them, &c.

We must not permit the Understanding to leap or fly from particulars to remote and general Axioms, such as are called the principles of Arts and Things, or by their constant verity to prove or discuss medial Axioms.

But then Men may hope well of Sciences, when by a true Scale, and continual not intermitted degrees, we ascend from particulars to lesser Axioms, then to medial, for some are higher than others; and lastly to universals; for the lowest Axioms differ not much from naked Experience, but the suppressive and more general which occur, are rational and abstracted, and have no solidity. The medial therefore are those true solid and lively Axioms, wherein mens fortunes and estates are placed, and above those also are those more general, if not abstracted, but truly limited by these medial or middle Axioms.

Therefore the humane understanding needs not feathers but lead and weights to hinder its leaping and flying. But this is not yet done, when it is we may have better hope of Sciences.

Now in constituting an Axiom another form of induction contrary to what was formerly, or is now used, is found out, and that not onely to prove or invent Principles, as they call them, but also lesser and medial Axioms, ye all. For that induction, which proceeds by simple enumeration, is a childish thing, and concludes precariously, being exposed to the danger of a contradictory instance. And yet most commonly it gives judgement from fewer instances than it ought, or from those onely which are at hand. But that induction which would induce to the invention and demonstration of Arts and Sciences, must separate Nature by due rejections and separations, and, after sufficient negatives, conclude upon affirmatives, which thing is not yet done, nor so much as attempted, unless by *Plato* only, who indeed, to examine definitions and Ideas, doth in some measure use this form of Induction. But for the good and lawful institution of such an induction or demonstration. many things are to be used, which never yet entered into any mortal mans heart, so that greater pains is to be taken herein than was ever yet spent in a Syllogism. Now the help of this induction is not onely to be used in finding out Axioms, but also in terminating motions, for certainly in this induction our greatest hope is placed.

Far more and better things, yea and in shorter time, are to be expected from the reason, industry, direction, and intention of men, than from chance the instinct of Animals, which hitherto have given the beginning to Inventions.

This also may be brought as an encouragement, that some things which are found out, are of that kind, that before their production it could not easily come into mans mind to imagine any thing of them, for every body despised them as impossible, *as the use of Guns the invention of Silk, the Seamans needle, &c.*

Therefore we hope there are in Natures bosome many secrets of excellent use, which have no alliance nor paralellism, with the things already invented

invented, but are placed out of Fancies Road, not as yet found out, which doubtless after many revolutions of Ages shall at last come forth, even as those former did. But by the way we now declare, they may speedily and suddenly be both anticipated and represented.

We must not omit another thing, which may raise up our hope. Let men reckon the infinite expence of Wit, time, [and money, which they are at in things and studies of far lesser use and value; the least part whereof, were it converted to sound and solid things, would conquer all difficulty.

Had we a man among us, who would *de facto* answer Nature's Queries, the Invention of all Causes and Sciences would be the study but of a few years.

Some without doubt, when they have read over our History and Tables of Invention, may object that something is less certain, or altogether, false in our experiments, and therefore perhaps will think with himself, that our inventions are founded on false foundations, and dubious principles. But this is nothing, for such things must needs happen at first, for it is all one as though in writing or printing some one Letter or other should be misplaced, which does not usually hinder the Reader, for such errors are easily corrected by the sence, &c.

Many things also will occur in our History and Experience, first slight and common, then base and mechanical, lastly too curious, meerly speculative, and of no use, which kind of things may divert and alienate the studies of men.

Now for those things which seem common, let men consider, that they themselves are wont to do no less than refer and accommodate the causes of rare things to these which are frequently done, but of things daily happening they enquire not the causes, but take them for granted.

And therefore they inquire not into the causes of weight, celestial rotation, heat, cold, light, hard, soft, slender, dense, liquid, consistent or solid, animate and inanimate, similar dissimilar, nor lastly Organical, but dispute and judge of other things, which happen not so frequently and familiarly by these as being evident, manifest, and received. But we, who know well enough, that no judgement can be made of rare and notable things, much less new things be brought to light without the causes of vulgar things, and the causes of causes rightly examined and found out are forced necessarily to receive the most vulgar things into our History: Furthermore we perceive nothing has hindered Philosophy more, than because things familiar and frequently happening do not stay and detain the contemplation of men, but are entertained by the by, and their causes not inquired into, so that information of unknown matters is not oftner required than attention in known things.

Now as touching the vileness and dishonesty of things, they are no less to be entertained in Natural History than the richest and most precious things, nor is Natural History thereby polluted, for the Sun does equally visit Pallaces and Sinks, and yet is not defiled. Again we do not build or dedicate a Capitol or Pyramid to the Pride of men, but we found an holy Temple for the worlds pattern in humane Understanding.

Therefore we follow our Copy for whatsoever is worthy of essence is worthy of Science, which is the image of Science, but vile things subsist as well as costly ones. Moreover, as out of some putrid matters, as musk and civet, sometimes the best odours come, even so from low and sordid instances

instances sometimes excellent light and information flows.

Before all things we have and must speak first of this thing, viz. That we now at first setting out, and for a time, seek only lociferous not fructiferous Experiments, according to the examples of Divine Creation, which only produced Light on the first day, and bestowed a whole day upon it, not intermingling with it, in that day, any material Work. If any one therefore think these things are of no use, it is all one as if he should think Light useless, because it is indeed no solid nor material being; for we may truly affirm, that the light of simple Natures being well examined and defined, is like Light which affords passage to all the secret Rooms of Operations, drawing after it all the companies and troops of Operations, and potentially comprizing the Fountains of most noble Axioms, yet in itself it is not of so great use: Thus the Elements of Letters of themselves and separately signify nothing, neither are of any use, but yet are like the first matter in the composition, and preparation of every word. Thus the seeds of things strong in power are as to use, except in their increase of no value, and the scattered beams of Light unless they unite together, become unbeneficial to men.

Some also will doubt rather than Object, whether we speak only of Natural Philosophy, or else of other Sciences; namely, Logick, Ethicks and Politicks to be perfected according to our way. But we surely understand what we have said of all this, and as vulgar Logick, which rules things by syllogism, belongs not onely to natural, but to all Sciences. So ours, which proceeds by induction, compriseth all things; for we make an History and inventory Tables, as well of Anger, Fear, Modesty, &c. as of Politick Examples, and so of the mental motions of memory, composition and division, judgement and the rest, no less than of heat and cold, or light and vegetation, &c. But as our method of interpretation after History is prepared and ordered, doth not only behold mental motions and discourses, as common Logick, but also the nature of things. So we govern the Understanding, that it may apply it self in a perfect and apt manner to the nature of things.

But that ought by no means to be doubted, whether we desire to destroy and demolish the Philosophy, Arts, and Sciences which we use, for we on the contrary willingly allow their use, cultivation, and honour; nor do we any wayes hinder, but that those which have been in credit, may nourish disputations, adorn Orations, be used in professory employments. Lastly, like currant money, be received among men by consent. But how truly we profess this very thing, which we mention concerning our affection and good will towards allowed Sciences, our publick Writings, especially our Books of the *Advancement of Learning* declare and attest.

It remains that we now speak somewhat concerning the excellency of the End. Had we before treated of these things, our expectations probably had better succeeded, but now we are in hopes, that all prejudices being removed, these matters may perhaps be of more weight.

For though we had perfected and compleated all things, nor had called others to share in our labours, yet should we have refrained these words lest we might be thought to proclaim our own merits, but seeing the industry of others is to be sharpened, and their minds to be stirred up and inflamed, 'tis fit we put men in remembrance of some things.

First then the Introduction of noble Inventions seems to carry the great

test

test sway amongst humane actions, as former ages also have judged; for they gave divine honor to the Inventors of things, but to those who were meritorious in civil affairs, as the founders of Cities and Empires, Lawgivers, Deliverers of their Countreys from temporal evil, Destroyers of Tyranny &c. they only decreed heroick honor. *Inventions also, are the new creations, they are man's Glory, they cause him to be a God to the rest of mankind. New inventions are of a wonderful consequence as the Art of Printing, Gun-powder, and the Sea mens compass.* These three have changed the Face and State of affairs in the whole World. First, in Learning. Secondly, in Warfare. Thirdly, in Navigation.

There are three sorts of ambition, the first desires to enlarge man's own power over Countries and People, this is common and ignoble, the Second, endeavours to enlarge other mens, as our Prince's Dominions, this hath more dignity, but no less desire.

But if any one endeavours to restore and enlarge the power and dominion of mankind, over the universality of things, doubtless this ambition is sounder, and nobler than the other two: Now mans dominion over things consists onely in Arts and Sciences, for nature is not trusted, but by obedience.

It is now high time that we propound this art it self of interpreting nature, wherein though we suppose we have given most true and profitable precepts, yet we do not attribute unto it any absolute necessity or perfection, as though nothing could be done without it. For we are of opinion if men had by them a just History of Nature and Experience, and would diligently study it, and could command themselves in two things; first in putting away received opinions and notions. Secondly, in forbearing a while generals and subgenerals, they would by the proper and genuine strength of the understanding, without any art, light upon our form of interpretation; for interpretation is the true and natural work of the mind, all obstacles being first removed: But certainly our presents will make all things more ready and sure.

Nevertheless we do not affirm that nothing can be added unto them. On the contrary we, who consider the mind not only in its own faculty, but as it is united with things ought to determine, that the art of invention may grow and increase with things invented.

Part of the
Novum Organum,
 OR,
A P H O R I S M S
 OF THE
 Interpretation of NATURE and KING-
 DOME of MAN.

Taken out of the Second Book.



It is the business and intent of humane power to produce and superinduce a new nature, and new things upon a body given to it; but it is the business and purpose of humane science, to find out the true form of this body, or the right difference, or the essence of nature, called *natura naturans*, or the Fountain of emanation: these words we use, because they express the thing, and discover it best. Now to these works of the first rank there be two of a second and inferior sort, that are subordinate. To the first, the transformation of concrete bodies from one to another within possible limits. To the second, invention in all generation and motion of a Secret proceeding continued from an apparant efficient and visible matter to a new form; as also the invention of an hidden schism of resting bodies not in motion.

Although the ways leading to the power and humane science, be nearly allied and almost the same, nevertheless it is the safest, because of that old and pernicious custome, of spending time in abstracts to begin and raise sciences from their very foundations, which look upon the active part in order, that it might consume and determine the active part, therefore we must see to some nature to be superinduced upon another body, what precept or direction any should require for that purpose, and that in an easie and plain expression.

For example, suppose any should desire to cover over Silver with the yellow colour of Gold, or give unto it an increase of weight, with a regard to the Laws of matter, or to make an obscure stone become transparent, or glass gluttinous, or to cause a body not vegetable to grow; we must see in such a case what direction or deduction may chiefly be desired, first a person would doubtless wish for something of a like Experiment to be shewn unto him, which might not fail in the operation, nor deceive in the undertaking. Secondly, he would desire some directions which might not bind him, and force him to certain mediums, and parti-

cular ways of acting, for it may be, that he may be unable to purchase, and procure unto himself such mediums, therefore if there be any other mediums and other methods of acting, besides that direction of producing such a nature, it may perhaps be of such things, as are in the power of the Worker; yet notwithstanding he may be excluded from the tryal of such things by the narrowness of the Rule, so as that he shall meet with no benefit. Thirdly, he may desire, that something may be shewn unto him, which may not be altogether so difficult, as the operation that is in question, but that comes nearer to the practise.

Therefore it is requisite, that every true and perfect Rule of working be certain, free, and well designing, or in order to action; therefore this is the same as the invention of a true form, for the form of any nature is such, that when it is supposed the nature it self must needs follow, therefore it is always present, wherever that nature is, it be speaks it in general and constitutes it. Such is the form of a thing that when it is taken away the nature of the thing is removed.

Therefore it is always absent from it, when that nature is absent, and is in it alone. Lastly, a true form is such, that it deduceth the nature of a thing out of the Fountain of being, which is common to many, and more known than the nature, as they speak, than the form. Therefore the Rule of knowing a true and perfect Axiom is this, *that another nature might be found out which might be convertible with the nature given, and yet be the imitation of a more known nature, like as of a true genus.* Therefore two Rules, the one active, the other speculative, are the same in effect, and what is most useful in operation is most true in speculation.

But the Rule or Axioms of transforming bodies are two fold. The first consider'd a body, as a troop or conjugation of simple natures, as in Gold these things do meet, that it is yellow, weighty, and of such weight that it may be beaten thin and drawn into wire, of such a bigness that it is not volatile, and that it loseth nothing by fire, that it is to be run in such a manner, that it is to be separated and loosed by such means, and the like of the other natures or properties of Gold.

Therefore such an Axiom deduceth the thing from the forms of the simple natures or properties, for he that knows how to bring new forms and methods of yellow, of weight, of fluidity, &c. he will see and take care of their graduations and means, that all these be conjoined in one body from whence transformation into Gold may be expected. Therefore this manner of marking belongs to the primary action, for there is the same method required in bringing forth one simple nature, as many; onely man meets with more difficulty in working, when he is to joyn together many natures, which meet not of themselves unless by the ordinary and usual ways of nature; nevertheless we may affirm that the method of working, which considers the simple natures, though in a concrete body, proceeds from those things, which in nature are constant, eternal, and universal, and open a wide door to mans ability, which as affairs are now manag'd our humane understanding can scarce comprehend or represent.

But the Second kind of Axioms, which depends from the invention of a secret proceeding, acts not by simple natures, but by concrete bodies, as they are found in natures ordinary course; for example, suppose an Inquisition is made from what beginnings, how, and in what manner Gold, or any other Metal, or Stone is generated from its first matter and deform substance until it comes to a perfect mineral, likewise in what manner Herbs grow, form

form their first concretion of the sap in the earth, or from the seed until it riseth up to be a plant with all the succession of motion, and the divers, and continued endeavours of nature. Likewise of the ordinary generation of animals from their conception to their birth, in like manner of all other bodies.

But this inquisition relates not onely to the generation of bodies; but also to other motions and workings of nature; for example, suppose an inquisition be made into the universal series, and continued manner of nourishment, from the first reception of the Food, until it turns into the substance of the body; likewise of the voluntary motion in animals, from the first impression of the fancy, and repeated endeavours of the spirits, to the movings and turnings of the Arters, or of the outward motion of the tongue, and lips, and other instruments to the giving of articulate voices; for these things relate to concrete or collegious bodies, and in operations they are lookt upon as particular and special custom of nature, not as fundamental, and common Laws, which constitute forms. But we must needs confess, that this method seems to be the most expedite, the most likely and hopeful, and more than the other primary.

But likewise the operative part, which answers this speculative, doth enlarge & encourage, working from those things, which are commonly found in nature, to certain things near at hand, or from those things to other very remote: but the highest and radical operations upon nature depend somewhat upon the primary Axioms. Moreover, when man hath not the liberty of acting, but onely of knowing and beholding, as in celestial bodies, which are not within mans reach he cannot change nor alter them. Nevertheless the inquisition of the fact it self, or of the truth of the thing, as well as the knowledge of causes and agreements, relates to the primary and universal Axioms of simple natures as the nature of voluntary relation, or the attractive vertue of the load stone, and many others, which are more common than the Celestial: neither can any body hope to terminate the question, whether in the daily motion, the earth doth in truth come round, or the Heavens unless he understands first the nature of voluntary rotation.

The hidden proceeding, which we have mentioned, is otherwise, so that our humane understanding, as it is now wrapt up in blindness, cannot easily search into it; neither do we understand certain measures, signs, or degrees of proceeding visible in bodies, but that continued proceeding, which for the most part is not subject to our senses.

For example, In all generation and transformation of bodies, we must inquire what is last, and what flies away, what remains, what is added, what dilates it self, what is drawn to it, what is united, what is separated, what is continued, what is cut off, what means, what hinders, what commands, and what yields, and many other things.

Again, neither are we to enquire after these things in generation and transformation of bodies, but in all other alterations and motions we are likewise to enquire, what proceeds, and what succeeds, what is most fierce, and what is most remis, what gives the motion, what commands, and the like.

All these things are unknown to, and never handled by the Sciences, which are composed by the grossest and the unblest wits. Seeing every natural action is transacted by the least beginnings, or by such as are so small, that they are not to be perceived by our senses, no body can hope

to rule or turn nature, unless he can comprehend and take notice of them in a due manner. Out of the two kinds of Axioms, which are already mentioned, Philosophy and Sciences are to be divided, (the common received words which approach the nearest to the discovery the of things, being applied to our meaning) namely that the inquisition of forms, (which in reason according to their own Laws are eternal and unmovable, constitutes the Metaphysicks; but the inquisition of the efficient, of the matter, of the secret proceeding, and hidden schismatism, all which things regard the common and ordinary course of nature, not the fundamental and eternal Laws, should constitute the Physicks. Now to these are subordinate two practical Sciences, to Physick the Mechanick is subordinate, and to the Metaphysicks, the better sort of Magick, in regard of its large ways and greater command in nature.

Now that we have thus described our doctrine we must proceed to the precepts in a right and orderly manner; therefore the discovery of the interpretation of Nature contains chiefly two parts. The first tends to the drawing out and raising Axioms from experience; the second teacheth how to take and derive Experiments from new Axioms. The first part is divided in a threefold manner into three ministrations; into that which relates to sense; into that which relates to the memory, and to that which relates to the mind or understanding.

First we must have a Natural and Experimental History; sufficient and good, which is the foundation of the thing: It must not be feigned or contrived onely, but we must find what Nature doth, or bears.

But the Natural and Experimental History is so various and scattered that it confounds and disturbs the understanding; unless it be limited and placed in a right order; therefore we must form some tables and ranks of instances in such a manner and order, that the understanding may work upon them.

Which, when it is done, the understanding left to it self, and moving of it self, is not sufficient, but unable, for the working of Axioms, unless it be ruled and assisted; therefore in the third place a lawful and true induction is to be brought in; which is the Key of the Interpretation; we must begin at the End and proceed back-wards to the rest.

An inquisition of forms proceeds in this manner; first, upon nature given, we must bring to the understanding all the instances of notes, that agree in the same Nature, though by different matters; Therefore such a collection is to be Historical, without any hasty contemplation or greater subtilty than ordinary, for example in the inquisition of the form of Hot.

Convenient Instances in the Nature of Hot.

1. **T**he Sun beams chiefly in Summer; and at Noon.
2. The Sun beams beaten back and pressed together; specially between Mountains, Walls, and through Burning-glasses.
3. All fiery Meteors.
4. Fiery Thunderbolts.
5. The bursting forth of flames out of the Caves of Mountains, &c.
6. All Flame.
7. All solid bodies of fires
8. Hot and Natural Baths.

9. All

9. All liquids heated or boiling.
 10. Vapors and hot smoak, and the air it self, which receives a strong and furious heat, when it is shut up, as in all places of reflection.
 11. Some kind of storms, by the constitution of the air, when there is no respect to the time of the year.
 12. The air shut up in subterraneous Caves, chiefly in winter.
 13. All hair and shag, as wooll, the skins of beasts, feathers, have something of heat.
 14. All bodies, as well solid as liquid, as well thick as thin, as the air, may be heated for a time.
 15. Sparks of fire out of Iron or steel, when they are struck out.
 16. All bodies rubb'd together as a stone, wood, cloth, &c. So that the axle-trees, and wheels of Carts sometimes are enflamed.
And the custome amongst the Western Indians is to make fire by rubbing.
 17. All green Herbs, and moist, shut up close together, as Roses, Pease in a basket, and Hay, if it be laid up wet will often take fire.
 18. Lime watered.
 19. Iron when it is first dissolved by strong waters, in glass without any assistance of fire, and likewise Pewter, &c. which is not so hot.
 20. All animals chiefly in their inwards, though the heat in insects, because of the smallness of their bodies cannot be perceived by our feeling.
 21. Horse-dung and the new excrements of such like creatures.
 22. Strong oil of Sulphur and Vitriol performs the office of heat in burning lining.
 23. The oyl of wilde Majoram, and the like, doth the office of heat in burning bones and teeth.
 24. The strong spirit of wine well rectified performs the office of heat, so that if the white of an Egg be cast into it, it will thicken and whiten almost in the same manner, as when it is boiled, and cloth being cast into it will burn, and be brown as a toasted piece of bread.
 25. All sweet sents, and hot herbs, as dragon-wort, cresses, &c. Although the hand feels not their heat, neither when they are entire, nor when reduced to ashes, but when they are chewed a little, they heat the tongue, and the pallet, as if they did burn.
 26. Strong vinegar, and all things acide or sharp, are hot in a member, where there is no * *Epidermis*, as in the eye and tongue, and in a wounded part, or where the skin is taken off, they cause pain like to that of heat.
 27. Also extraordinary cold seems to be burning.
 28. Garlick.
- This List we are want to name the Table Essence and Presence.
Secondly, we must examine with our understanding the instances which are deprived of * nature given.

* Or skin to cover such as covers the body.

* *Natura data.*

The Instances at hand which have not the nature of heat.

THe beams of the Moon, of the Stars, and of the Comets seem not to be hot to our feeling, for we may observe that the greatest frosts are

are in the full Moon, but the fixed and bigger Stars, when the Sun goes under them, or draws near them, they are thought to be heated by the heat of the Sun, as when the Sun is in *Leo*, or in the Dog Days.

The Sun beams, in the middle region of the air, are not hot: The reason is, because that region is not near enough to the body of the Sun, from whence the beams burst forth, nor to the earth that reflects them back; therefore this is plain, upon the tops of mountains, which are not the highest, snow abides upon them alwayes. But on the contrary, some have taken notice, that on the top of the Pick of *Tenerif*, and on the top of the Mountains of *Peru*, there is no snow to be seen, but upon the sides of these hills snow remains; therefore the air on the top of those Mountains is not cold, but subtil and sharp, so that in the mountains of *Peru* it pricks and offends the eyes with its sharpness, and the stomach, so that it makes men inclinable to vomit. The Ancients have taken notice, that, on the top of mount *Olympus*, the air is so subtil, that such as climb up to the top, must carry with them sponges dipt in water and vinegar, and often put them to their mouths and noses, because the air is there so subtil, that it sufficeth not for respiration. They say also that there is there so great a calm, free from all rain, storms, snow, and winds, that some who sacrificed there, upon *Jupiters* altar, having made with their fingers an impression in the Althes upon the Altar, the next year the same Letters and impression were to be seen without the least alteration. And such as venture up to the top of the Pick of *Tenerif* go by night and not by day, they are called upon a little after the rising of the Sun by their guides to hasten down again, because of the danger, as it seems, caused by the subtilty of the air, for fear that it should stifle the spirits.

The reflection of the Sun beams near the northern pole are very weak and inefficacious in matter of heat.

Let this Experiment be tried, take a Looking Glass made contrary to the burning-glasses, and put it between your hand, and the Sun beams, and take notice whether it don't diminish the heat of the Sun, as the burning-glass increaseth it.

Try this other Experiment, whether by the best and strongest burning-glasses it is not possible to gather together the beams of the Moon in one point, and cause thereby a small degree of warmth.

Try also a burning-glass upon any thing that is hot, but not luminous or shining, as upon hot urine, or hot stone, which is not fiery or upon boiling water or the like, and see whether it increaseth not the heat, as at the rayes of the Sun.

Try also a burning glass before the flame of the fire.

The Comets have not always the same effects in encreasing the heat of the year, though some have observed that grievous droughts have succeeded them. Bright beams, and columns, and * *Chasmata*, and such like meteors appear more frequently in the winter than in the Summer, and especially in great frosts, when the air is very dry. Thunder and Lightnings seldom happen in Winter, but in the time of great heats. But falling Stars are thought to consist for the most part of a thin substance, bright and kindled, near a kin to the strongest fire.

There are some Lightnings that yield light but don't burn, such happen alwayes without thunder.

The breaking out, and eruptions of flames are to be seen in cold regions as well as in hot, as in *Islandia*, *Greenland*, as the trees which grow in cold

Countreys

* Gaping of the firmament.

Countreys are more combustible, more full of Pitch, and Rosom, than others that grow in hot Regions.

All flame is hot, more or less; Nevertheless, they say, that *Ignis fatuus*, which lights sometimes against a wall, hath but little heat: it may be like the flame of the spirit of wine, which is mild and soft; but that flame is yet milder, which some credible and discreet Historians affirm to have been seen about the hair and heads of Boys and Girls, which did not so much as singe the hair, but did softly wave above them.

Every thing that is fiery, when it turns into a fiery red, when it should not yield any flame, it is always hot.

Of hot Baths, which happen by the situation and nature of the Sun, there hath not been sufficient inquiry.

All boiling liquors in their own nature are cold, for there is no liquor to be toucht, which is so naturally, which remains always hot; heat therefore is given to it for a time, as an acquired nature or quality; so that the things themselves, which are in their operations most hot, as the spirit of Wine, some chymical Oiles, and the Oyl of Vitriol, and of Sulphur, and the ike, which at the first touching are cold, but soon after they burn.

There is a doubt whether the warmth of wool, of skins, and of feathers, and the like, proceed not from some small inherent heat, as it riseth from animals, or whether it proceeds not from a fatness and Oyliness, which is agreeable to warmth, or whether it comes not from the inclusion and fraction of the Air.

There is nothing Tangible, or yielding spirit, but is apt to take fire: yet many things differ in this, that some receive heat sooner, as Air, Oyl, and water; others not so quickly, as Stone, and Metals.

There can be no sparks struck out of Stone, or Steel, or out of any other hard substance, unless some minute parts of the substance of the Stone or Metal be also struck out.

There is no Tangible Body to be found, but becomes warm by rubbing; therefore the Ancients did fancy, that the heavenly Globes had no other warmth or vertue to cause heat, but that which was derived to them from the attrition of the air, when they were rowled about in their swift and furious course.

Some Herbs and Vegetables, when they are green and moist, seem to have in them some secret heat; but that heat is so small, that it is not to be perceived by feeling when they are single, but when they are heaped together, and shut up, that their spirits cannot escape out into the air, but encourage one another; then the heat appears, and sometimes a flame in convenient matter.

New lime becomes hot when it is sprinkled with water, either because of the union of heat, which before was dispersed, or by the irritation and exasperation of the spirits of water and of fire; for there is a kind of conflict and antiperistasis. How the heat is caused will easily appear, if instead of Water, Oyl be cast into it, for Oyl, as well as Water, Unites the Spirits shut up, but it will not Irritate or anger them.

All dung of Animals, when it is old, hath the power of heating, as we may see in the fatting of ground.

Aromatick substances, and Herbs sharp at the taste, are much hotter when they are taken inwardly; we may try upon what other substances they discover any hot vertue. The Seamen tell us, that when heaps and lumps

lumps of Spices or Aromatick substances, are long shut up clofs, and then opened, there is some danger for such as stir them, or take them out first; for the fumes that arise from them are apt to inflame the spirits, and to give fevers. Likewise an Experiment may be tried, whether their dust will not be able to dry Bacon, and other flesh hung over it, as over the smoak of a fire.

There is an accrimony or penetration in cold things, as Vinegar, and Oyl, of Vitriol, as well as in hot, as in the Oyl of wilde Marjoram, and the like; therefore they cause a like pain in animals, and in inanimate substances they dissolve, and confirm the parts. In animals there is no pain but is accompanied with a certain sense of heat.

Cold and hot have many effects common to them both, tho produced in a different manner; for snow seems to burn the hands of children, and cold preserves flesh from putrefaction, as well as fire, and heat draws together some substances to a lesser bulk as well as cold.

A Table of degrees, or of such things as are comparatively hot.

WE must first speak of those things, which seem not to the feeling to be hot, and yet are so potentially afterwards: we shall descend to mention such things as are actually, or at the feeling hot; and to examine their strength and degrees of heat.

1. Amongst the solid and Tangible bodies, there is none found, which is hot naturally or Originally, neither Stone, nor Metal, nor Sulphur, nor any Mineral, nor Wood, nor Water, nor the Carcase of any anima; but in baths there is hot water by accident, either by subterraneous flames, as fire; such as is in *Etna*, and many other mountains, or by the conflict of bodies, as heat is produced in the dissolution of Iron and Pewter. Therefore our feeling cannot be sensible of any degree of heat in inanimate substances, but they differ in their degrees of cold, for Wood is not so cold as Metals.

2. But touching things that have heat potentially in them, and that are ready to kindle, there are many inanimate substances of that nature, as Sulphure, Naptha, Salt-peter, &c.

3. Those things which before were inflamed, as the Horse dung, by an animal heat, or lime, ashes, and soot; by the fire they yet retain certain reliicks of their former heat. Therefore there are certain distillations, and separations of bodies, effected by the heat of Horse dung; and the heat is raised in lime by Water, as we have already said.

4. Amongst the Vegetables there is no plant, nor part of a plant as the droppings, or sap, which seems to our feeling to be hot.

5. There is no part of dead animals nor any thing separated from them, which appears hot, nor the Horse dung it self, unless it be shut up, and buried close. But nevertheless all dung seems to have heat potentially in it, as may appear by the improvement of the ground. Likewise the Corpses of dead animals have the same secret heat potentially; therefore in Church-yards, where they are daily buried, the ground hath by that means acquired a secret heat, which soon consumes a Carcase newly buried, and sooner than other earth.

6. Whatsoever fatness the ground, as all sorts of dung, Chalk, Sea-sand, Salt, and the like have a secret disposition and tendency to heat.

7. All Putrefaction hath some beginnings of a little heat, though not to that degree as to be perceived by feeling

8. The

8. The first degree of heat of those things, which are to be felt. To be hot by feeling is the heat of animals, that have a great Latitude of degrees, for the lowest degree, as in insects, is not to be perceived by touching. The highest degree scarce attains to the degree of heat of the sun beams in the hottest Regions and Times: Nevertheless it is reported of *Constantine* and of several others, that they were naturally so hot, and their constitution so dry, that in several violent feavers their bodies did burn so much, that when any did but touch them with the hand it would seem to burn a while after.

9. All animals do encrease their heat by motions and exercise, by Wine, good Chear, and Venery, and in burning Feavers, and pain,

10. All animals in the intervals of Feavers are ceased with Cold and shivering at first, but a little after they burn the more.

11. We may further inquire and compare the heat of several animals, as of Fishes, four Footed Beasts, Serpents, Birds, and according to their several species, as in a Lyon, in a Kite, or a Man; for, according to the common opinion, Fishes are inwardly less hot, Birds most, especially, Pigeons, Hawks, and Austriches.

12. Let us inquire further of the heat compared in the same animal with the several parts and members, for Milk, Blood, Seed, Eys, are of a moderate degree of warmth, and less hot then the exterior flesh of animals, when it moves and is stirred about, but what degree of heat is in the brain, stomach, heart, and other parts, was never yet found out.

13. All animals, during the Winter and in Cold storms, are outwardly cold, but inwardly they are thought to be hotter than in summer.

14. The Cœlestial heat, in the hottest Regions, times of the Year, and Day, is not so hot as burning Wood, Straw, or Linnen, neither doth it burn but through a glass.

15. The Astrologers inform us, that some Stars are hotter than other, Amongst the Planets, next to *Sol*, *Mars* is the hottest, afterwards *Jupiter*, then *Venus*, but *Luna* is thought to be Cold, and *Saturn* colder: Amongst the fixed Stars *Sirius* is the hottest, then *cor Leonis* or *Regulus*, afterwards the Dog Star, &c.

16. The Sun warms most when he is nearest to our *Zenith*, over our Heads; the same we may think of the other Planets, according to their degree of heat, for example, *Jupiter* is hotter when he is under *Cancer* or *Leo*, than when he is under *Capricornius* or *Aquarius*.

17. The Cœlestial heat is increased three several ways, Namely, when the Globe is over our heads, when it draw near by propinquity, and by a conjunction or association of several Stars.

18. There are several degrees of heat in flames, and fires in strength and weaknes.

19. I Judge that the flame, that bursts forth and proceeds from certain imperfect metals, is very strong and fierce.

20. But the flame of thunder seems to be fiercer than all other flames, for sometimes it hath dissolved Iron itself into drops, which all other flames cannot do.

21. In things set a fire there is also a different degree of heat, we esteem the weakest to be burn'd Linnen, or Tinder, touch Wood or Match; after them the weakest fire is that of a burn'd coal, and laths set a fire: But the hottest we think to be Metal inflamed, as Iron and Copper, &c.

22. Motion increaseth heat, as we may perceive by blowing with bellows: for some of the harder sort of Metals are not to be dissolved, or liquefied by a dead fire, unless it be Stirred up by blowing.

23. We Judge that the great fires that happen, when the Wind blows hard, do struggle and strive more against the wind than they do yield to it, for the flame in such a case flies back with a greater fierceness when the Wind yeilds than when it drives it.

By the common fire, especially by the subterraneous fires, which are the remotest and shut up closest from the rayes of the Sun, you may expel the Caelestial Nature from the form of hot.

By the heating of bodies of all sorts, I mean of Minerals, of Vegetables, and of the exterior parts of Animals, of Water, of Oile, &c. In drawing them nearer to the fire or any hot body you may expel all variety, and subtil texture of bodies. By Iron or other fiery Metals, which may heat other bodies without minishing ought of the weight or substance, expel the mixture of the substance of another hot thing.

Here follows several other directions and precepts most useful, if well understood; but because I am limited I proceed to the other helps of nature interpretation recommended by the worthy Author. First, He placeth prerogatives of instances. Secondly, Helps of induction. Thirdly, A rectification of induction, &c. Amongst the prerogatives of instances the solitary instances are first. They are such as discover the nature, which is inquired after in such subjects, which have nothing common with other subjects, except that Nature. And again, such as discover not the nature inquired for in such subjects, which are like in all things with other subjects, unless it be in the Nature it self for example, if the Nature of Colotr, is inquired into, the solitary instances are Gems of Christal, which yeild not not only a color in themselves, but cast it upon a Wall.

They have nothing common with the fired colours in flowers, coloured Gems, Metals, Wood, &c. unless it be the Colour; from whence it may easily appear, that colour is nothing else but a Modification of the Image of light cast into, and received in the first kind, by divers degrees of lightning upon the body; in the Second, by the textures and various schesmatisms of the body.

The Second are the instances called Migrantes, they are such in which the nature inquired for passeth to the generation, when before it was not, or contrariwise passeth to corruption, when it was before these instances are useful for a right understanding of the nature of things, and to direct us to practise; for example, suppose the nature of whiteness be inquired into, the instance putting to generation is whole glafs, and glafs beaten to with powder, likewise simple water, and water stirred about into froth, for whole glafs and water are transparent, not white, but glafs beaten and water turned into froth, are not transparant, but white; therefore we must inquire what happens from that change or passage to glafs or water; for it is evident that the form of whiteness is conveyed in by the contusion of the glafs, and the stirring of the water, and there seems to be nothing added besides the communion of the parts of glafs and water, and the mixture of the air.

By these instances we may understand such as pass, not onely to generation and privation, but such as proceed to Majoration and Minoration; for they tend also to discover to us the true forms of things.

The

The Third assistances are named offensive, they are such as discover the nature inquired, for nakedly and in it self also, in its rise, and highest degree of power, free from all impediments; for as every body receives the forms of many natures conjoynd, so as that in the concrete one weakness depresseth, breaks, and binds another, by that means every form is obscured: Now there are some subjects to be found in which the nature sought for is above the rest in its full vigor, either by the absence of the impediment, or by the predominancy of its vertue. These Instances do chiefly discover the nature of forms. For example, if you inquire for the nature of weight take quick-silver, which is the heaviest of all other things beside Gold, which is not much heavier: But the instance of quick-silver is more proper to discover the nature of weight, than Gold; because Gold is solid and close, but quick-silver is liquid and full of spirits; nevertheless it is heavier than Diamonds, and the most solid things, from whence we may understand the form of weight, which consists in the abundance of the matter, not in the compactness and closeness of the thing.

The Fourth instances are named clandestine. They shew the nature inquired for in its lowest power, and as it were in the Cradle and beginning, rising and hid under a contrary nature that domineers over it. These instances are of great consequence to find out the forms of things, for example, if we inquire for the nature of solid; the clandestine instances are such as discover a weak, and lowest degree of consistency, a solidity in a fluide substance, as in a bubble of water, which is as a thin skin of solidity determined and made of a watery body. By this example, and by snow, froth, and melted Metals, we may understand that liquid and solid, are but ordinary notions, agreeable to the sense, for in truth there is in every body a liquidity which is weaker and more infirm in bodies homogeneous, as water, but stronger in heterogeneous, therefore the conjunction to an heterogeneous body unites and joyns together, but the insinuation of the homogeneous dissolves and loosens.

The fifth sort of Instances are named Constitutive. They are such as constitute a species of the nature inquired into, as a lesser form, for as the lawful forms which are convertible with the natures sought for, are hid in secret, & are not easily to be found, the thing it self and the weakness of our intellect requires that the particular forms be not neglected, but be diligently inquired into, for whatsoever unites nature, although in an imperfect manner, it shews a way to find out forms.

For example, if any desires to understand nature of memory, or that which excites or helps memory, the constitutive instances are order and distribution, which evidently help our memory, also places in an artificial memory, &c. So that there are six lesser forms of those things which help memory; namely; limitation; a reducement of intellectual matters, to a sensibility an impression into a strong affection, an impression into a pure and disingaged mind, a multitude of helps and a former expectation.

The Sixth are conformable instances or proportioned, for they shew similitudes, agreements, and conjugations of things, not in the lesser forms, as the constitutive instances do, but in a concrete body. They shew and discover a certain agreement between bodies, although they don't much conduce to find out forms, nevertheless they are very beneficial to reveal the Fabrick of several parts of the universe, and in its members they make a kind of dissection, and therefore they lead us, as it were, by the hand to high and noble axioms.

For

For example, these are conformable Instances, a looking glass and an eye, the make of the ear, and the places where the Eccho sounds, but of which conformity, besides the observation of resemblance, which is very useful for many things, it is easie to gather and form this Axiom, *viz.* that the organ for the senses, and the bodies, that send back the sounds to the sense, are much alike. Again, the understanding being from hence informed, may easily rise to another Axiom higher and more noble; namely, that there is no difference between the Consents, or Sympathies, of Sensible Bodies, and such as are inanimate without sense, unless it be that in the former, there is an animal spirit in the body, fitted to receive and entertain it, but in the latter there is none. Therefore as many consents as there are in inanimate bodies, so many senses there might be in animals, if there were as many holes or perforations in the animate body, for the animal spirit to move and fly to the member rightly disposed, as a right organ, &c. Another conformable instance is the root of a plant, and the branches. Every vegetable swells and pushes out its parts round about as well downwards as upwards neither is there any Difference between the roots and branches, but only that the root is shut up in the Earth and the branches, spread in the air and the Sun, for if any one will but take a tender branch that grows, and turn the top towards the ground, though it toucheth not the earth, it will push forth a Root and not a Branch. And on the contrary, if the earth be put upon a plant, and be prest with a stone or other hard substance that might hinder the plant from spreading up, it will bring forth branches in the ground and underneath.

Other conformable instances are the Gum of Trees, and the most part of the gems of Rocks, for either of them are but the exudations and sweatings, the first out of the sap of trees, the Second out of Rocks, from hence proceeds the clearness and splendor of both. Namely from the thin and subtil percolation from hence it is also that the hairs of animals are not so beautiful and of such a lively colour as the plumes of birds, for their sweat is not so fine when it issues out of their skin as when it comes out of a Feathers.

Other conformable instances are the Fins of Fishes, and the Feet of four Footed Beasts, or the Feet and Wings of Birds unto which *Aristotle* adds four Circles in the motion of Serpents. Therefore in this great Fabrick of the World, the motion of living creatures seems to be performed by four Arters or flexions.

Also in terrestrial animals the teeth, and in birds, their bills are alike, from whence it is evident that in all perfect animals there is a certain hard substance that draws to the mouth.

The Seventh are irregular instances, such as discover bodies in their whole, which are extravagant and broken off in Nature, and do not agree with other things of the same gender, but are only like to themselves, therefore stiled *Monodicae*. They are useful to raise and unite nature, to find out the genders and common natures, to limit them by their true differences. Neither are we to desist from an inquisition until the properties and qualities, which are found in such things as are thought to be miracles in nature, may be reduced, and comprehended under some form or certain Law, that all irregularity and singularity might be found to depend upon some common form.

Such instances are the Sun and Moon amongst the Stars, the Loadstone among the Stones, quick-silver amongst metals, the Elephant, amongst the four footed

Footed Beasts, &c. The eighth sort of instances are named *Diviantes*, because they are Natures errors, and Monsters, when Nature declines and goes aside from its ordinary course. The use of these is to rectifie the understanding, to reveal the common Forms; neither in these ought we to desist from the inquisition until we have found out the cause of the deviation. But this cause doth not rise properly to any Form, but onely to the hidden proceeding to a Form, for he that knows the ways of Nature, he shall with more ease observe its deviations. And again, he that understands its Deviations can better discover its ordinary ways and methods.

The Ninth sort of instances are Named *Limitanea*, such as discover the species of bodies, which seem to be composed of two species, or the Rudiments between one species and another: [such are Flies between rottenness and a plant, certain Comets between stars and fiery meteors, Flying, Fishes, between Birds, and Fishes, &c.

The Tenth are instances of Power, which are the noblest, and the most perfect, as the most excellent in every art; for as this is our business chiefly, that Nature should be obedient and yield to the benefits of men; it is fitting, that the works, which are in the power of men, as so many provinces, be overcome and subdued, should be taken notice of, and reckoned specially such as are most plain and perfect, because from them there is an easier and a nearer way to new inventions, never found out before.

The Eleventh instance are stiled *Comitatus* and *Hostiles*. They are such as discover a concrete body, such in which the nature inquired after, doth always follow it as an individual companion, and on the contrary, in which the Nature required doth always fly from it, & is excluded out of its company as an enemy: for out of such instances propositions may be formed, which may be certain, universal, affirmative, and negative, in which the subject shall be such a body in concrete, & the predicate the nature it self that is sought, for example if you seek for hot the *Instantia comitatus* is the flame, &c.

The Twelfth are *subjunctive*, &c.

The Thirteenth are instances of Union which confound and joyn together Natures, which are esteemed to be heterogeneous, and for such are noted and confirmed by the received divisions.

For example, if the nature required is hot. That division seems to be good and authentick, that there are three kinds of heat; the Cœlestial, the animal, and that of the fire. These heats especially one of them being compared with the other two, are, in essence and species, or by a specifick nature, differing and altogether heterogeneous: for the heat of the Cœlestial Globes, and the animate heat, encourage and help generation; but the heat of the fire corrupts and destroyes. It is therefore an instance of Union. This experiment, is common enough when the branch of a vine is brought into the house, where there is a continual fire, by which the Grapes will ripen a month sooner than those that are in the air: so that fruits may be brought to Maturity when they hang upon the tree by the fire, whereas, this seems to be a work proper only to the Sun. Therefore the understanding is perswaded from hence to inquire, what are the differences which are really between the heat of the Sun and that of the fire; from whence it happens that their operations are so unlike, and they nevertheless partake of the same common nature. The differences are found to be four. First, that the heat of the Sun in respect of the heat of the fire is a degree much milder and more favourable. Secondly, That it is conveyed, to us through the air, which of it self is humide. Thirdly, and chiefly that it is very unequal, sometimes drawing
near

near and increasing in strength, anon departing and diminishing, which very much contributes to the generation of bodies. Fourthly, that the Sun works upon a body in a long space of time; but the working of the fire, through mens impatiency, performs the business in a shorter time. If any will be careful to attempt and reduce the heat of the fire to a more moderate and milder degree; which may be done several ways, if he will besprinkle it, and cause it to send forth something of humidity; chiefly if he imitates the Suns inequality. Lastly, if he staves a little, by this means, he shall imitate or equal, or in some things cause the fires heat to be better than the Suns.

The Fourteenth sort of instances are the Judicial, which is when an inquisition is made, and the understanding is placed in an *Equilibrium*, in an uncertainty where to assign the cause of the Nature inquired for.

For example, suppose any man seeks the cause of the flux and reflux of the sea twice a Day. This motion must needs proceeds from the progress and regress of the waters. in the manner of water troubled up and down in a basin, which when it toucheth the one side of the basin, it leaves the other. Or it must proceed from the rising and falling of the waters in the bottom, as boiling water: now there is a doubt unto which of these causes the ebbing and flowing, or flux and reflux of the sea is to be assigned; which if the first of these be asserted, then it will follow, that when the flux is on this side, the reflux will be at the sametime on the other. But *Acosco* with some others have found after a diligent inquiry, that upon the Coast of *Florida*, and upon the Coast of *Spain*, and *Africa*, the ebbing and flowing of the Sea happens at the same moment of time. *This question is further examined in the Original.*

The Fifteenth sort of instances are of divorce, because they discover the separations of those natures which often meet.

The Sixteenth are the Instances of the lamp, or of the first information, which assist the sense, for as all interpretation of nature begins by the sense, and from the perception of the sense leads by a right and straight way to inform the understanding, which are the true notions and axioms; it must needs be, that the more copious and exact the representations of the senses are, so much the better and the happier all things must succeed.

The Seventeenth sort of Instances are filed of the Gate, because they help the immediate actions of the senses. Amongst the senses, it is certain that the sight is the chief, in regard of information; therefore we must seek assistances to this sight.

The eighteenth are Instances called *Citantes*, which deduce that which is not sensible to be sensible.

The Nineteenth are Named Instances of supplement, because they supply the understanding with a right information when the senses fail, therefore we must Fly to them; when we have no proper instances. This is done in a two fold manner, either by Gradation, or by Analogy. For example, the Medium is not to be found which stop the Load-stone in moving the Iron, neither gold, if we put it between, nor silver, nor stone, nor glass, nor wood, &c. Nevertheless after an exact tryal, there may be a certain medium found, which might dull its vertue more than any thing else comparatively, and in some degree, as that the loadstone should not be able to draw Iron to it self through gold of such a thickness, &c.

The Twentieth sort are filed Instances *persecantes*, because they cut nature asunder, &c.

The One and Twenty sort are instances of the Rod, or of *non ultra*.

The Two and Twentieth are called Instances *Curriculi*. They measure nature by the moments of time, as the instances of the Rod measure it by the degrees of space. For all motion and natural action is performed in a time, some quicker, some slower, &c.

The Three and Twentieth sort are instances *Quanti*, &c.

The Four and Twentieth sort are instances of Predominancy,

The 25. sort are called *Innuentes*, because they discover and design the benefits of men.

The Six and Twentieth sort are named *Instantia Polychrestas*.

The Seven and Twentieth are the Magick instances. They are such in which the matter or the officient is but little and slender, if compared with the greatness of the work, or of the effect that follows; in somuch that though they are common, they are looked upon as miracles, &c.

I am forced to cut short, and abbreviate many excellent directions, and to pass over several weighty observations, because I am limited. However this abbreviation may give the Reader a taste of the whole.

FINIS.

